

### REMARKS

Regarding the status of the present application, Claims \_ and \_ have been amended and Claims 1-5 are pending in this application. Reconsideration of this application is respectfully requested.

The Abstract of the disclosure is objected to by the Examiner. The Abstract has been amended to address the Examiner's issues. Withdrawal of the Examiner's objection is respectfully requested.

Figure 1 of the drawings was objected to because "a body 11" and "a south facing radiator 22" are recited in the specifications but are not shown on figure 1. Fig. 1 has been amended to add reference numeral "11" thereto. However, reference numeral "22" is shown in Fig. 1 at the upper left side of the spacecraft body. Figs. 2 and 3 have been amended to include reference numeral "11". Enclosed herewith are amended drawing figures containing proposed amendments marked in red ink. Also enclosed is a set of replacement reproducing masters having the amendments included therein. Entry of the amended drawings and replacement reproducing masters is respectfully requested.

Figures 1-3 were objected to because "aft deck 14" is recited in the specification but is not shown on the figures. Reference numeral "14" designating the "aft deck" has been added to Figs. 1-3 along with reference numeral "25" generally designating the "one or more coupling or loop heat pipes 25".

Claim 5 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner indicated that there was insufficient antecedent basis for limitations "~~when in orbit, cross-coupling heat coupled to the respective payload radiators to the~~ opposite facing deployable radiator. Although the Examiner's rejection is not entirely understood, Claim 5 has been amended in a manner that is believed to address the Examiner's issue. It is respectfully submitted that Claim 5 is now clear and definite. Withdrawal of the Examiner's rejection is respectfully requested.

Claims 1 and 3 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,823,477 issued to York. The Examiner's position is that "York clearly shows a spacecraft (10) comprising a body (12), a plurality of solar arrays (Bus module 14 further includes a pair of solar panels 18 that convert sunlight into electricity, refer to column 2 lines 51-53), first and second opposite facing payload radiators (28, 108), first and second opposite facing deployable radiators (28, 108), and one or more coupling heat pipes (32,46, and 48) that cross couple opposite facing payload and deployable radiators. Refer to figures 1, 2, and 3."

The York patent discloses a "Device and method for minimizing radiator area required for heat dissipation on a satellite. The device includes radiator panels with heat pipes embedded throughout. The embedded heat pipes have flanges that protrude from the plane of the surface of the radiator panel. Units, such as amplifiers and RF filters, are mounted on L shaped heat

pipes. The unit heat pipes are mounted on the flanges of the embedded heat pipes. The unit heat pipes are thermally linked to the same area of the radiator panel, thereby minimizing radiator area necessary for heat dissipation."

It is respectfully submitted that the Examiner has misinterpreted the teachings of the York patent in making the rejection. It is respectfully submitted that the Examiner's assertion that the York patent discloses "first and second opposite facing payload radiators (28, 108)" and "first and second opposite facing deployable radiators (28, 108)" is in error. The York patent discloses a "radiator 28", which is the rectangular component at the bottom of the spacecraft body. It is noted that in fig. 1, the lead line "28" does not extend to this component.

Reference numerals 106 and 108 are not used in the specification of the York patent, although they are shown in Fig. 1. Component "22" which appears to include components 106 and 108 are opposite facing "reflectors 22" as is expressly stated in the York patent.

The express teachings of the York patent are that his invention relates to "radiator panels 28 located on the north and south sides of the platform module 14". There are only two radiator panels 28 and there are no opposite facing deployable radiators disclosed or suggested in the York patent. Furthermore, there are no coupling heat pipes that cross couple opposite facing payload and deployable radiators disclosed or suggested in the York patent.

Therefore, with regard to Claim 1, it is respectfully submitted that the York patent does not disclose or suggest "first and second opposite facing deployable radiators" or "one or more coupling heat pipes that cross couple opposite facing payload and deployable radiators", as is recited therein. Accordingly, it is respectfully submitted that Claim 1 is not anticipated by, nor is it obvious in view of, the York patent. Withdrawal of the Examiner's rejection of Claim 1 is respectfully requested.

With regard to Claim 3, it is respectfully submitted that the York patent does not disclose or suggest "first and second opposite facing deployable radiators" or "one or more coupling heat pipes that cross couple opposite facing payload and deployable radiators", as is recited therein. Accordingly, it is respectfully submitted that Claim 3 is not anticipated by, nor is it obvious in view of, the York patent. Withdrawal of the Examiner's rejection of Claim 3 is respectfully requested.

Claims 2 and 4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,823,477 issued to York in view of U.S. Patent No. 4,880,050 issued to Nakamura et al. The Examiner's position is that "York discloses the applicant's invention as claimed with the exception of providing loop heat pipes. Nakamura discloses a thermal management system includes a plurality of closed-loop heat pipes 124. Refer to column 5 lines 22-26 and figure 2." The Examiner concluded that "it would have been obvious to modify York's invention to include loop heat pipes to improve the cooling process."

Dependent Claims 2 and 4 are considered patentable based upon the patentability of Claims 1 and 3 from which they depend. Accordingly, withdrawal of the Examiner's rejection of Claims 2 and 4 is respectfully requested.

Claim 5 was rejected under U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,823,477 issued to York. The Examiner's position is that "It is inherent that the spacecraft will be launched into the orbit using a vehicle like a spaceship or even a missile."

In view of the above arguments with respect to Claim 1 and 3, it is respectfully submitted that the York patent does not disclose or suggest a "spacecraft heat dissipation method" comprising the steps of "configuring a spacecraft to have ... first and second opposite facing payload radiators, first and second opposite facing deployable radiators, and loop heat pipes cross coupling opposite facing payload and deployable radiators" and "when in orbit, cross coupling heat coupled to a respective payload radiators to an opposite facing deployable radiator", as is recited in Claim 5. Notwithstanding the Examiner assertions, the York patent does not disclose or suggest the use of opposite facing payload and deployable radiators or that the respective payload radiators are cross-coupled to an opposite facing deployable radiator.

Accordingly, it is respectfully submitted that Claim 5 is not obvious in view of the York patent. Withdrawal of the Examiner's rejection of Claim 5 is respectfully requested.

Attached hereto is a marked-up version of the changes made to claims by the present amendment. The attached page is captioned "Version with markings to show changes made."

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure to the extent indicated by the Examiner.

In view of the above amendments and arguments, it is respectfully submitted that all ~~pending Claims are not anticipated by, nor are they obvious in view of, the cited references,~~ taken singly or together, and are therefore patentable. Accordingly, it is respectfully submitted that the present application is in condition for allowance. Reconsideration and allowance of this application is respectfully requested.

Respectfully submitted,



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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION**

Please amend the Abstract as follows

A spacecraft, along with [an improved] a spacecraft radiator system and spacecraft heat dissipation method are disclosed. The spacecraft comprises a body, a plurality of solar arrays, and the spacecraft radiator system. The spacecraft radiator system comprises first and second opposite facing payload radiators, first and second opposite facing deployable radiators, and one or more coupling or loop heat pipes cross coupling opposite facing payload and deployable radiators so that they function in tandem. By cross-coupling the opposite facing payload and deployable radiators, one of the two radiators acting in tandem is always in the shade during solstice seasons. Consequently, the solar load processed by the radiator system is minimized, thereby, increasing the thermal dissipation capability of the radiator system by approximately 15%.

**IN THE CLAIMS**

Claim 5 has been amended as follows.

5. (Amended) A spacecraft heat dissipation method comprising the steps of:  
configuring a spacecraft to have a body, a plurality of solar arrays, first and second opposite facing payload radiators, first and second opposite facing deployable radiators, and loop heat pipes cross coupling opposite facing payload and deployable radiators;  
5 launching the spacecraft into orbit; and  
when in orbit, cross coupling heat coupled to [the] a respective payload radiators to [the] an opposite facing deployable radiator.

**Fig. 1**

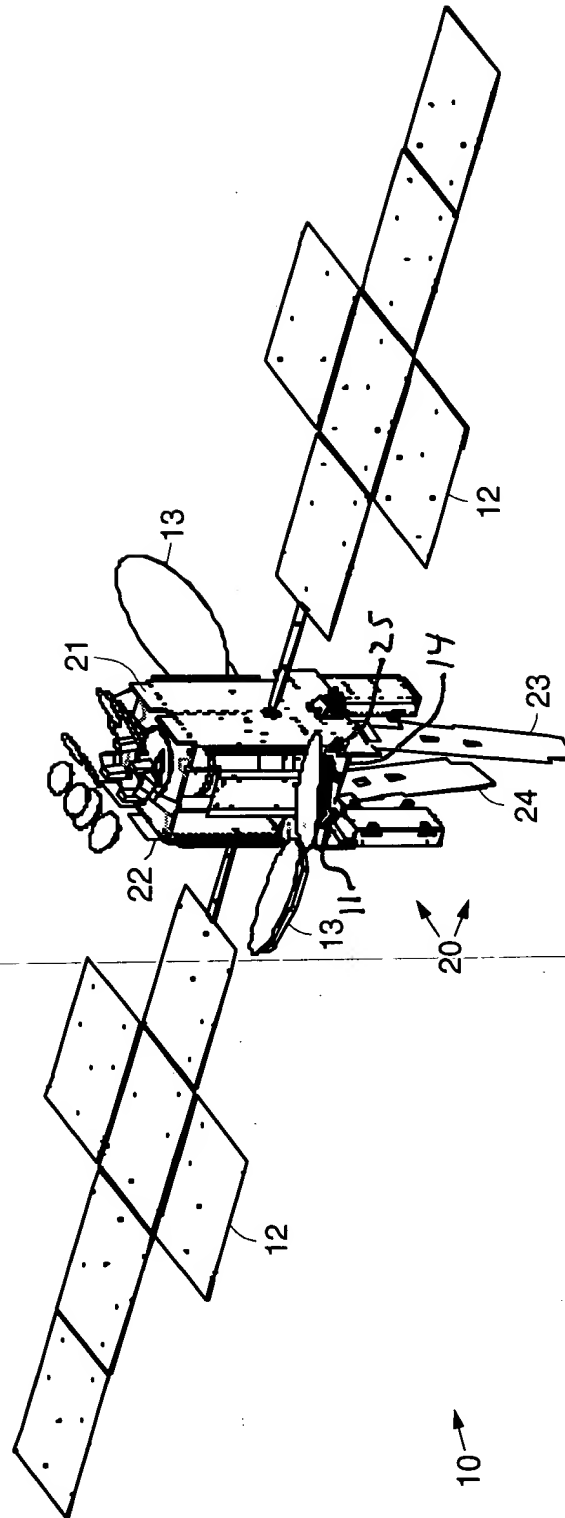


Fig. 2

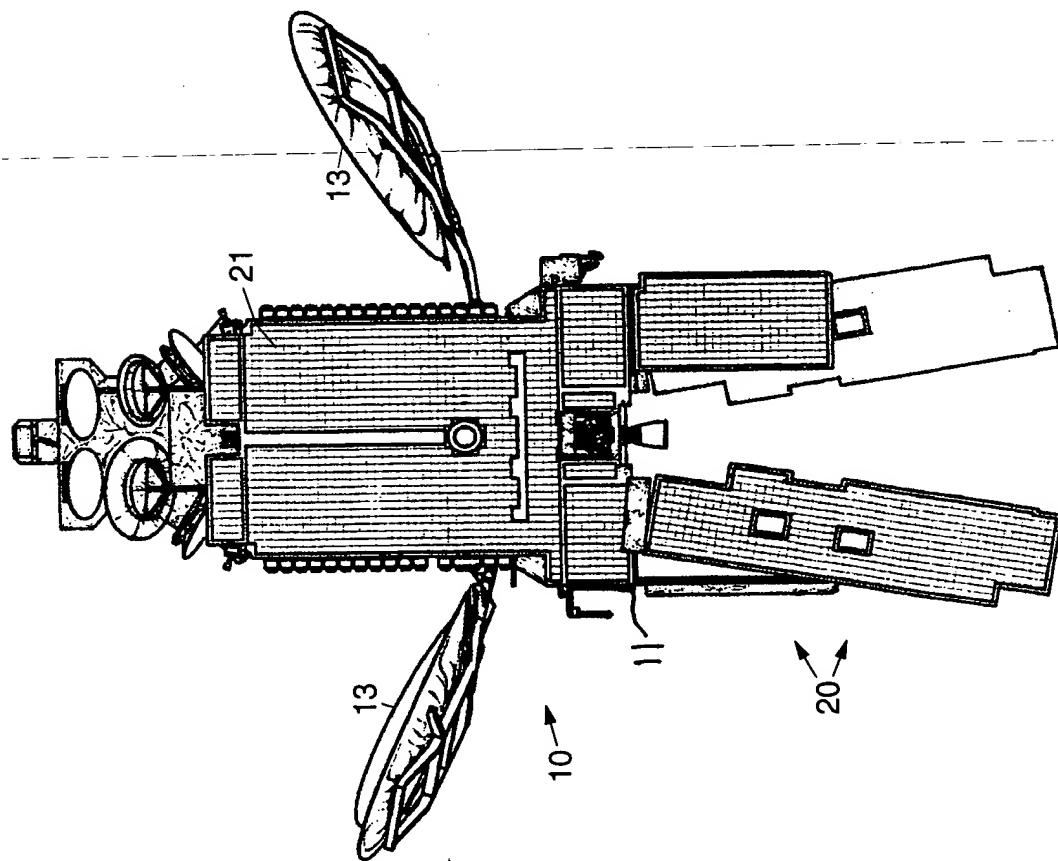


Fig. 3

